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# **WHO CHOOSES TO OWN A MANUFACTURED HOME ?**

By

Maria I. Marshall

Working Paper # 06-12

December 2006

**Dept. of Agricultural Economics  
Purdue University**

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## **Abstract**

Little research has been conducted on the choice of dwelling by U.S. homeowners. Few studies have included manufactured housing into the dwelling choices available to homeowners. This study focuses on the effects of demographic and socioeconomic variables on a household's choice to own a manufactured home. A multinomial logit model was used to determine what type of households chooses to own a manufactured home when other traditional dwelling choices are available. I found that income and education play a major role in dwelling choice.

Keywords: Manufactured Housing; Housing Choice; Dwelling Choice, Multinomial Logit

JEL: J 11, O18, R20, R31

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# **WHO CHOOSES TO OWN A MANUFACTURED HOME?**

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## **Introduction**

Research on the type of dwelling chosen by household in the United States (U.S.) has been limited in its development. Studies done in this area have been primarily tenure choice analyses (see, for example, Robst et al., 1999; Gabriel and Painter, 2003; Deng et al., 2003; Freeman 2005). In other words, studies have focused on the decision of whether to own or rent a dwelling unit. Little research has been conducted on the choice of dwelling by U.S. homeowners, especially manufactured housing.

Several studies focus attention to the exclusive estimation of housing choice (Borsch-Supan and Pitkin, 1988; Fischer and Aufhauser, 1988; Kim 1992). The housing literature indicates that increases in income will have a positive impact on both housing expenditures and the probability that households will choose own a home rather than rent. However, these conventional analyses do not provide any insight as to how income increases will affect the relative choice probabilities for different types of housing units within a given tenure category (Boehm, 1982). Boehm (1982) found that in terms of housing size, a larger family size increases the probability of choosing a larger dwelling.

Several other studies estimate tenure choice and dwelling type jointly (Ahmad, 1994; Tu and Goldfinch, 1996; Cho, 1997; Skaburskis, 1999; Boehm and Schlottmann, 2004; Yates and Mackay, 2006). Cho (1997) tried to find the major determinants that influence housing choices for 1000 households in the city of Chongju, Korea within a multinomial logit model framework. A Korean household could choose between the following four dwelling types (1) own-occupied detached, (2) owner-occupied multiple-family, (3) rented detached, or (4) rented multifamily. Cho found that age, education, income, household size all were statistically significant in determining housing choice.

Skaburskis (1999) extended Cho's (1997) work and examined the housing choices for households in Ottawa, Canada. The households could choose to rent or own a single-family detached home, a townhouse, or an apartment. He examined the difference in the predictions between the multinomial logit model and the nested multinomial logit model and found that the differences in the predictions made by the two models were too small to matter in the study of the choices among the major building types. His estimated models showed that the demand for larger size dwellings increases with an increase in household size, age, or income.

However, none of the aforementioned studies include manufactured housing as a viable dwelling of choice. Boehm (1995) studied the perceived difference in structural quality between manufactured homes and traditional rented and owner-occupied homes. He found that manufactured housing compared favorably with traditional dwelling alternatives. He goes on to state that manufactured housing may be a cost-effective ownership choice for low-income

households.

Dwelling size has been used as a measure of dwelling quality (Boehm 1982). For example, the average price per square foot of a new site built home in 2005 was \$91(2414 average square feet) versus \$39 for a new manufactured home (1595 average square feet) (Census). Meanwhile, the living space for poor U.S. households averages 1228 square feet whereas the average for all U.S. households is 1875 square feet (Rector and Johnson, 2004). Dwelling size therefore, may not be the appropriate quality measure for dwelling quality. In fact, manufactured home owners perceived the quality of their home as high (MHI, 2002).

Owens (1996) found that manufactured home owners were more likely to be less educated and lower income. Beamish et al. (2001) found that individuals perceived manufactured home owners be less educated, have lower income, and less stable family structure than was actually true. Are the stereotypes correct? Are the poor and uneducated the only ones who live in manufactured homes? Is it just single-mothers? Not according to the Manufactured Housing Institute which claims that 47% of manufactured homeowners have some college education, average household income is \$28,000, and over 50% of manufactured home residents are married (2002).

Burns (2001) states, “Manufactured housing (formerly known as mobile homes, house trailers, or trailer homes) is an under examined component of the domestic setting. Manufactured housing is important though it is neither widely nor well understood.” This study focuses on the effects of demographic and socioeconomic variables on a household’s choice to own a manufactured home. Few studies have included manufactured housing into the dwelling choices available to homeowners. Not including manufactured housing into the choice alternatives for homeowners has led to very little research into the socio-economic and demographic factors that influence the choice to own a manufactured home. This is especially important because manufactured homes are a source of affordable housing for lower income individuals and make up a substantial amount of all housing units.

Manufactured housing makes up 8% of all housing units nationally (Census, 2002). Rural areas have traditionally had a higher level of manufactured housing, up to 18% of all housing units (MHI, 2002; Nitschke, 2004). The South especially has used manufactured housing as a means to increase home ownership in rural areas with 50% more manufactured housing in rural areas than any other region in the nation (Census, 2002).

### **Conceptual Model**

Households across the U.S. can own various types of dwellings. Therefore, a study of housing choice has to take these substitutable alternatives into consideration. I focus on the choice of dwelling type, with the assumption that tenure choice (ownership) has been made. With this assumption, the three dwelling types most likely to be owned in the U.S. (manufactured housing, single-family attached housing, and single-family detached housing) become the choice set (Figure 1).

*---Figure 1 Here---*

The household will then make a decision on which dwelling type to own after examining the alternatives. The household chooses a dwelling type such that the level of utility derived from that choice is maximized subject to the household's budget constraint. I followed the work by Cho (1997), Ahmad (1994), Kim (1992), and Skaburskis (1999) that relates household characteristics to the choice of housing. The underlying conceptual model describes the utility a household gains from owning a particular dwelling type:

$$U_{ji} = \beta_j X_i + e_{ji} \quad (1)$$

Where  $U_{ji}$  is the utility household  $i$  gains from choice  $j$ ,  $X_i$  is a vector of household and household head characteristics such as family size, race of household head, and education of household head,  $\beta_j$  is the estimated coefficient, and  $e_{ji}$  is the error term. If a household makes housing choice  $j$ , then one can assume that the utility of choice  $j$  is the maximum among the  $J$  utilities of housing choice. Thus, the probability that housing choice  $j$  is made, is  $Prob(U_j > U_k)$  for all  $k$  not equal to  $j$  (see Green, 2000).

### **Methods and Data**

Households have the choice of living in the following three housing structures: a manufactured home, a single-family detached home, or a single-family attached home. A multinomial logit model was used to determine the socio-economic and demographic factors of housing choice. The multinomial logit model for housing choice is,

$$Prob(Y_i = j) = \frac{e^{\beta_j x_i}}{\sum_{k=1}^3 e^{\beta_k x_i}}, j = 1, \dots, 3 \quad (2)$$

The estimated equations provide a set of probabilities for the  $J+1$  housing choices of a household with the characteristics  $x_i$  (see Greene, 2000). In estimating the model, single-family attached home is used as the reference alternative with which the remaining housing alternatives (manufactured home and single-family detached home) are compared.

### **Data**

Data from the 2004 American Community Survey was obtained using the Integrated Public Use Microdata Series (IPUMS). Information on the household and household head was obtained for 88,491 households in five states representing four regions established by the U.S. Census. The Southern region is represented by Kentucky and Texas. Pennsylvania, Nebraska, and Oregon represent the Northeast region, Midwest region, and West region, respectively. Table 1 demonstrates the distribution of dwelling type among the five states. Manufactured housing is 7% of total housing in the sample whereas nationally it is 8%. The distribution of dwelling type is similar, except in Pennsylvania where 17% of households own single-family attached homes versus 2% or less for the other four states. I would expect households in Kentucky or Texas to be more likely to live in a manufactured home than those living in Nebraska, Oregon, or Pennsylvania.

---Table 1 Here---

Personal characteristics of the household head that were included are race, ethnicity, age, marital status, education, employment status, and veteran status (Boehm and Schlottmann, 2004). Race and ethnicity are confined to black, white, and Hispanic individuals. Four percent of the sample are black and 10% are of Hispanic origin. Only adults older than twenty-one years of age are included in the sample. Seventy-two percent of the sample are married, 9% are self-employed, and 14% are veterans. One would expect that an older and more educated individual is less likely to live in a manufactured home. One would also expect that married individuals would be just as likely to live in single-family home as a manufactured home (Beamish et al., 2001).

The household's total income is expected to have an impact on the choice of dwelling type. Households are divided into four income groups: (1) less than \$30,000 (22%), (2) \$30,001 to \$49,999 (21%), (3) \$50,000 to 75,000 (23%), and (4) over \$75,000 (35%). Only 4% of the sample receive food stamps. The budget constraint also includes the cost of owning the home. Housing costs are ownership costs which include the cost of utilities (electric, water, fuel, gas), the cost of space (for a manufactured home), and the mortgage (loan) payment. Choosing a manufactured home is expected be negatively correlated with household income and housing cost. Because I expect lower income households to choose to own a manufactured home, households receiving food stamps should be more likely to own a manufactured home than a single-family detached or attached home.

Family size is also an important factor in the choice of dwelling type (Cho, 1997; Skaburskis, 1999; Boehm and Schlottmann, 2004). Thirty-nine percent of the sample had only two members in the household. In contrast, 19% of the households comprised of three people while 17% had four household members. Family size is expected to be negatively correlated with owning a manufactured home (Owens, 1996).

## **Results**

Table 2 contains the variable names and definitions and Table 3 illustrates the results of the multinomial model of housing choice in (2). Estimation of the model is performed using SAS software. The household demographic and socio-economic variables are all statistically significant. The geographic variables are also statistically significant.

*--Tables 1 and 2 Here--*

Household income performed as expected. Households with incomes less than \$75,000 were more likely to own a manufactured home and less likely to own a single-family detached home. In fact, the odd of owning a manufactured home are 2.3 times better for a household with income less than \$30,000 than for a household with income over \$75,000. The odds of a household with income of \$30,000 owning a single-family detached home are 0.83 time less.

Individuals that are black or of Hispanic origin are less likely to live in manufactured homes than whites not of Hispanic origin. The odds of Blacks and Hispanics owning a manufactured home are 0.08 times and 0.21 times less, respectively, than whites. The higher the education of the household head the less likely it is that the household will choose a manufactured home and the more likely it is that the household will choose a single-family detached home. A veteran is more

likely to live in a manufactured home. The odds, for a veteran, of owning a manufactured home are 1.26 times better than for a non-veteran, while the odds of owning a single-family detached home are 0.97 times worse. However, a self-employed individual is less likely to own a manufactured home and more likely to own a single-family detached home.

Married couples are more likely to choose a manufactured home or a single-family detached home than a single-family attached home. The larger the family the more likely the household will choose a manufactured home or a single-family detached home. A household that receives food stamps is more likely to own a manufactured home, approximately 1.49 times more likely. While a household that receives food stamps is 0.93 times less likely to own a single-family detached home.

As expected, households in Nebraska, Oregon, and Pennsylvania are less likely to choose to own a manufactured home than households in Texas. On the other hand, households in Kentucky are more likely than households in Texas to live in manufactured homes. The odds are 1.19 times better for a household in Kentucky to own a manufactured home than for a household in Texas. However, households in Kentucky are also 1.11 times more likely to own a single-family detached home than households in Texas.

### **Conclusions**

A multinomial logit model was used to determine what type of households chooses to own a manufactured home when other traditional dwelling choices are available. A sample of 88,491 households in Nebraska, Kentucky, Oregon, Oregon, Pennsylvania, and Texas was used to determine if more manufactured homes are owned in the South than in other regions of the country as shown in other studies. Three dwelling types were chosen 1) manufactured home, 2) single-family detached home, and single-family attached home.

I found that indeed the lower the income the higher the odds that a low income household will own a manufactured home versus a single-family attached or detached home. The results also showed that a family that receives food stamps is more likely to own a manufactured home than a single family home. In 2005, the average sales price of a new manufactured home was \$62,300 (Census) while the average sales price of a new site built single-family home was \$297,000. A new site built single-family home is approximately 5 times more expensive than a new manufactured home. The evidence shows that Boehm (1995) was correct in stating that manufactured housing is a viable and realistic alternative for low income households.

Beamish et al. (2001) found that the perceived characteristics of manufactured home owners were incorrect. I also found that the stereotype of the manufactured home owner as having a less stable family structured to be false. Married couples and families are just as likely to own a manufactured home as a single family home. Whites are more likely than blacks and Hispanics to own a manufactured home. However, they are also less likely than whites to own a single-family detached home.

I, like Owens (1996), found that education plays a role in the choosing to own a manufactured home. The higher the education level of the household head the less likely that a manufactured



home will be chosen over a single-family attached home. Meanwhile the higher the education level of the household head the more likely that a single-family detached home will be chosen over a single-family attached home.

Manufactured housing has been used to boost home ownership in rural areas. Housing policy in the South has especially taken advantage of the low cost of manufactured homes. The results show that households in southern states are more likely to own a manufactured home. However, household in Texas and Kentucky are also more likely to own single-family detached homes than household in Nebraska, Oregon, and Pennsylvania.

Manufactured housing is a real and viable dwelling choice. Tenure choice models should take this important part of the housing market into account. This dwelling choice especially needs to be taken into account when low income households are part of a sample.

Manufactured homes continue to be stigmatized not only in terms of placement but also in terms of the lending practices associated with them. Most manufactured homes are purchased with personal property loans at higher rates than mortgage loans because some lenders still do not consider manufactured housing as real property. Therefore, it is also important for community planners and policy makers to understand who owns manufactured homes. In fact, by restricting the placement of manufactured homes community planners may be restricting the opportunities and mobility of low income households.

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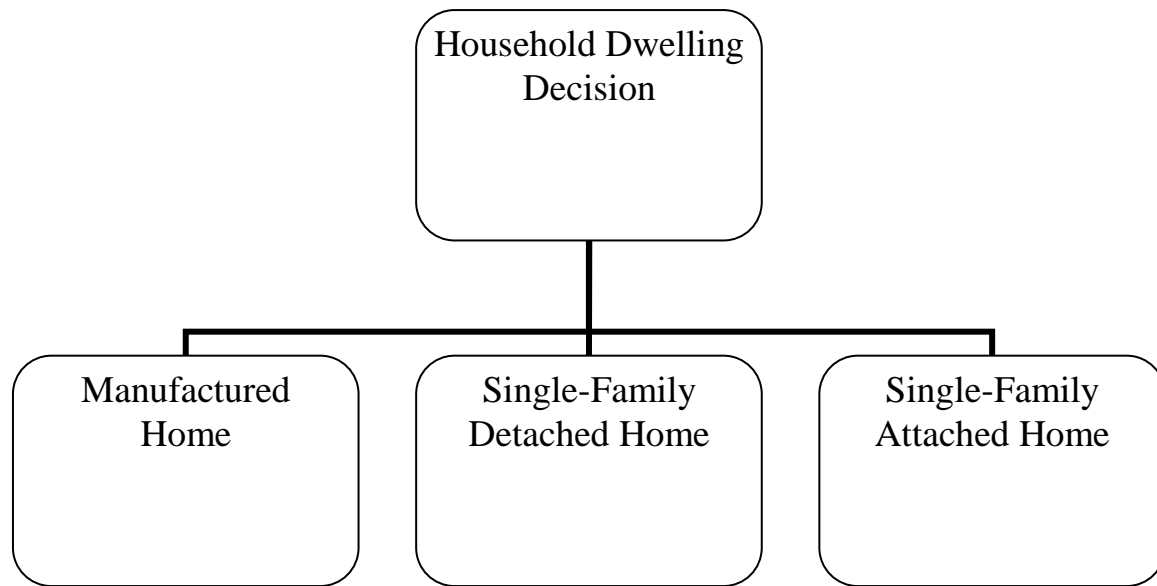


Figure 1. Structure of Housing Choices

Table 1. Sample dwelling type by state, 2004.

State	Manufactured	Single-Family Detached	Single-Family Attached
Kentucky	1,967 (15%)	11,307 (84%)	151 (1%)
Nebraska	216 (3%)	6,579 (95%)	126 (2%)
Pennsylvania	1,115 (4%)	21,813 (79%)	4,538 (17%)
Oregon	732 (10%)	6,072 (87%)	171 (2%)
Texas	2,382 (7%)	30,646 (91%)	676 (2%)
Total	6,412 (7%)	76,417 (86%)	5662 (6%)

Note: Percents of total state housing are in parentheses. Percents may not sum to 100% because of rounding. Source:

Table 2. Variable names and definitions

Variable Name	Definitions
Household Income Less than \$30,000	Dummy variable for household income
Household Income \$30,001 to \$49,999	Dummy variable for household income
Household Income \$50,000 to \$75,000	Dummy variable for household income
Housing Cost	Cost of owning the dwelling of choice
Black	Dummy variable for race: 1=black, 0=white
Hispanic Origin	Dummy variable for ethnicity
Age	Age of household head
High School	Dummy variable for educational achievement
Some College	Dummy variable for educational achievement
Bachelor's Degree	Dummy variable for educational achievement
Graduate Degree	Dummy variable for educational achievement
Veteran	Dummy variable for veteran status
Self-Employed	Dummy variable for self-employment status
Married	Dummy variable for marital status: 1=married, 0=otherwise
Family Size	Number of family members in household
Food Stamps	Dummy variable for receiving food stamps
Nebraska	Dummy variable for living in Nebraska
Kentucky	Dummy variable for living in Kentucky
Oregon	Dummy variable for living in Oregon
Pennsylvania	Dummy variable for living in Pennsylvania

Reference categories for independent variables: household income over \$75,001; did not finish high school; living in Texas.

Table 3. Multinomial logistic regression of dwelling choice

Variable	Manufactured Home	Single-Family Detached Home
Household Income Less than \$30,000	0.8373*** (0.00448)	-0.1837*** (0.00319)
Household Income \$30,001 to \$49,999	0.6815*** (0.00426)	-0.1333*** (0.00295)
Household Income \$50,000 to \$75,000	0.4667*** (0.00413)	-0.2290*** (0.00269)
Housing Cost	-0.00015*** (0.00000)	0.0000*** (0.00000)
Black	-2.5705*** (0.00602)	-1.5878*** (0.00295)
Hispanic Origin	-1.5825*** (0.00497)	-0.6795*** (0.00406)
Age	-0.0286*** (0.00010)	0.00874*** (0.00007)
High School	-0.1005*** (0.00372)	0.2351*** (0.00304)
Some College	-0.4865*** (0.00422)	0.2469*** (0.00335)
Bachelor's Degree	-1.4915*** (0.00577)	0.1439*** (0.00371)
Graduate Degree	-1.8511*** (0.00843)	0.0620*** (0.00430)
Veteran	0.2295*** (0.00395)	-0.0277*** (0.00297)
Self-Employed	-0.2881*** (0.00518)	0.0588*** (0.00381)
Married	0.6311*** (0.00288)	0.6238*** (0.00214)
Family Size	0.1032*** (0.00107)	0.1148*** (0.00082)
Food Stamps	0.3901*** (0.00557)	-0.0738*** (0.00480)
Nebraska	-1.7305*** (0.0105)	-0.3929*** (0.00807)
Kentucky	0.1748*** (0.00719)	0.1066*** (0.00678)
Oregon	-0.1815*** (0.00657)	-0.6158*** (0.00592)
Pennsylvania	-3.3973*** (0.00386)	-2.6708*** (0.00297)
Intercept	6.3053*** (0.0113)	4.6433*** (0.00785)
N	6,412	76,417

Total N=88,491 Note: Reference category for the equation is single-family attached home. Standard errors in parentheses. Log-Likelihood Ratio = 200000